combine_day_night_otus_wallace2018

May 7, 2024

1 Analysis with the OTUs table

Merging OTU day and night samples

[ ]:
```
import pandas as pd

otu_table_taxonomy_df = pd.read_table('/media/rsantos/4TB_drive/Projects/
 ↪UGA_RACS/16S/Workflow/2_QiimeOtus/2f_otu_table.sample_filtered.
 ↪no_mitochondria_chloroplast_taxonomy.tsv',
                                      comment='#', dtype = {'OTU': str})

otu_table_taxonomy_df.set_index('OTU', inplace=True)
otu_table_taxonomy_df.drop('taxonomy', axis=1, inplace=True)
otu_table_taxonomy_df.head()
```

[ ]:
```
         LMAN.8.14A0051  LMAN.8.14A0304  LMAD.8.14A0247  LMAN.8.14A0159  \
OTU
4479944             1.0             2.0             1.0             1.0
995900              0.0             1.0             0.0             0.0
1124709             0.0             0.0             0.0             0.0
541139              0.0             0.0             0.0             0.0
533625              1.0            36.0             0.0             0.0

         LMAD.8.14A0051  LMAD.26.14A0381  LMAD.26.14A0533  LMAD.8.14A0281  \
OTU
4479944             1.0              3.0              1.0             0.0
995900              0.0              0.0              0.0             5.0
1124709             0.0              0.0              0.0             0.0
541139              0.0              0.0              0.0             0.0
533625              0.0              2.0              0.0             0.0

         LMAD.8.14A0295  LMAN.26.14A0319  …  LMAN.26.14A0303  \
OTU                                       …
4479944             0.0              0.0  …              0.0
995900              8.0             15.0  …              0.0
1124709             0.0              0.0  …              0.0
541139              0.0              0.0  …              0.0
533625              0.0             12.0  …              0.0
```

```
         LMAN.8.14A0011  LMAD.26.14A0137  LMAN.26.14A0327  LMAN.8.14A0205  \
OTU
4479944             0.0              0.0              0.0             0.0
995900              0.0              0.0              0.0             0.0
1124709             0.0              0.0              0.0             0.0
541139              0.0              0.0              0.0             0.0
533625              0.0              0.0              0.0             0.0

         LMAD.8.14A0265  LMAD.26.14A0155  LMAD.26.14A0167  LMAD.26.14A0481  \
OTU
4479944             0.0              0.0              0.0             0.0
995900              0.0              0.0              0.0             0.0
1124709             0.0              0.0              0.0             0.0
541139              0.0              0.0              0.0             0.0
533625              0.0              0.0              0.0             0.0

         LMAN.26.14A0329
OTU
4479944              0.0
995900               0.0
1124709              0.0
541139               0.0
533625               0.0

[5 rows x 540 columns]
```

[ ]:
```
otu_genotype_day_day_dict = {}
otu_genotype_day_night_dict = {}

sample_dict = {}

for sample in otu_table_taxonomy_df.columns:
    plot = sample.split('.')[2]
    day = str(sample.split('.')[1])
    day_period = sample.split('.')[0].replace('LMA', '')
    if plot+"_"+day in sample_dict.keys():
        sample_dict[plot+"_"+day]+=1
    else:
        sample_dict[plot+"_"+day]=1
    if day_period == 'D':
        otu_genotype_day_day_dict[sample] = plot+"_"+day
    elif day_period == 'N':
        otu_genotype_day_night_dict[sample] = plot+"_"+day
    else:
        print('Error: ', sample)
        exit(1)
```

```
day_night_samples = []
day_or_night_sample = []
more_samples = []

for key in sample_dict.keys():
    if sample_dict[key] == 1:
        day_or_night_sample.append(key)
    elif sample_dict[key] == 2:
        day_night_samples.append(key)
    elif sample_dict[key] > 2:
        more_samples.append(key)
    else:
        print('Error: ', key)
        exit(1)

print(f'There are {len(day_or_night_sample)} cases that one sample is available␣
 ↪for plot.')
print(f'There are {len(day_night_samples)} cases that day and night samples are␣
 ↪available.')
print(f'There are {len(more_samples)} cases that day and night samples are␣
 ↪available.')
```

```
There are 42 cases that one sample is available for plot.
There are 249 cases that day and night samples are available.
There are 0 cases that day and night samples are available.
```

Separating day from night samples into two different matrices

[ ]:
```
otu_table_day_cols = otu_table_taxonomy_df.loc[:,␣
 ↪list(otu_genotype_day_day_dict.keys())]
otu_table_night_cols = otu_table_taxonomy_df.loc[:,␣
 ↪list(otu_genotype_day_night_dict.keys())]
```

[ ]:
```
print(otu_table_day_cols.shape)
print(otu_table_night_cols.shape)
```

```
(9057, 260)
(9057, 280)
```

[ ]:
```
otu_table_night_cols.head()
```

[ ]:
```
         LMAN.8.14A0051  LMAN.8.14A0304  LMAN.8.14A0159  LMAN.26.14A0319  \
OTU
4479944             1.0             2.0             1.0              0.0
995900              0.0             1.0             0.0             15.0
1124709             0.0             0.0             0.0              0.0
541139              0.0             0.0             0.0              0.0
```

```
533625              1.0            36.0             0.0             12.0

         LMAN.26.14A0341  LMAN.8.14A0119  LMAN.8.14A0135  LMAN.26.14A0465  \
OTU
4479944              0.0             0.0             0.0              0.0
995900               2.0             5.0             3.0              1.0
1124709              0.0             0.0             0.0              0.0
541139               0.0             0.0             0.0              0.0
533625               2.0            56.0             0.0             42.0

         LMAN.8.14A0343  LMAN.26.14A0169  …  LMAN.8.14A0197  LMAN.8.14A0247  \
OTU                                       …
4479944             0.0              0.0  …             0.0             0.0
995900              1.0              1.0  …             0.0             0.0
1124709             0.0              0.0  …             0.0             0.0
541139              0.0              0.0  …             0.0             0.0
533625              0.0              0.0  …             0.0             0.0

         LMAN.26.14A0211  LMAN.8.14A0339  LMAN.26.14A0093  LMAN.26.14A0303  \
OTU
4479944              0.0             0.0              0.0              0.0
995900               0.0             0.0              0.0              0.0
1124709              0.0             0.0              0.0              0.0
541139               0.0             0.0              0.0              0.0
533625               0.0             0.0              0.0              0.0

         LMAN.8.14A0011  LMAN.26.14A0327  LMAN.8.14A0205  LMAN.26.14A0329
OTU
4479944             0.0              0.0             0.0              0.0
995900              0.0              0.0             0.0              0.0
1124709             0.0              0.0             0.0              0.0
541139              0.0              0.0             0.0              0.0
533625              0.0              0.0             0.0              0.0

[5 rows x 280 columns]
```

Renaming the columns from runs to "day_plot"

[ ]:
```
otu_table_day_cols = otu_table_day_cols.
 ↪rename(columns=otu_genotype_day_day_dict)
otu_table_night_cols = otu_table_night_cols.
 ↪rename(columns=otu_genotype_day_night_dict)
```

[ ]:
```
otu_table_day_cols.head()
```

[ ]:
```
         14A0247_8  14A0051_8  14A0381_26  14A0533_26  14A0281_8  14A0295_8  \
OTU
```

```
4479944        1.0        1.0         3.0         1.0        0.0        0.0
995900         0.0        0.0         0.0         0.0        5.0        8.0
1124709        0.0        0.0         0.0         0.0        0.0        0.0
541139         0.0        0.0         0.0         0.0        0.0        0.0
533625         0.0        0.0         2.0         0.0        0.0        0.0

         14A0169_26  14A0069_8  14A0497_26  14A0023_8  …  14A0345_8  \
OTU                                                    …
4479944         0.0        0.0         0.0        0.0  …        0.0
995900          5.0        1.0         1.0        1.0  …        0.0
1124709         0.0        0.0         0.0        0.0  …        0.0
541139          0.0        0.0         0.0        0.0  …        0.0
533625          0.0        0.0         0.0        0.0  …        0.0

         14A0267_8  14A0009_8  14A0007_8  14A0093_26  14A0137_26  14A0265_8  \
OTU
4479944        0.0        0.0        0.0         0.0         0.0        0.0
995900         0.0        0.0        0.0         0.0         0.0        0.0
1124709        0.0        0.0        0.0         0.0         0.0        0.0
541139         0.0        0.0        0.0         0.0         0.0        0.0
533625         0.0        0.0        0.0         0.0         0.0        0.0

         14A0155_26  14A0167_26  14A0481_26
OTU
4479944         0.0         0.0         0.0
995900          0.0         0.0         0.0
1124709         0.0         0.0         0.0
541139          0.0         0.0         0.0
533625          0.0         0.0         0.0

[5 rows x 260 columns]
```

[ ]:
```
otu_table_night_cols.head()
```

[ ]:
```
         14A0051_8  14A0304_8  14A0159_8  14A0319_26  14A0341_26  14A0119_8  \
OTU
4479944        1.0        2.0        1.0         0.0         0.0        0.0
995900         0.0        1.0        0.0        15.0         2.0        5.0
1124709        0.0        0.0        0.0         0.0         0.0        0.0
541139         0.0        0.0        0.0         0.0         0.0        0.0
533625         1.0       36.0        0.0        12.0         2.0       56.0

         14A0135_8  14A0465_26  14A0343_8  14A0169_26  …  14A0197_8  \
OTU                                                    …
4479944        0.0         0.0        0.0         0.0  …        0.0
995900         3.0         1.0        1.0         1.0  …        0.0
1124709        0.0         0.0        0.0         0.0  …        0.0
```

```
541139          0.0          0.0          0.0          0.0  …          0.0
533625          0.0         42.0          0.0          0.0  …          0.0

          14A0247_8  14A0211_26  14A0339_8  14A0093_26  14A0303_26  14A0011_8  \
OTU
4479944         0.0         0.0        0.0         0.0         0.0        0.0
995900          0.0         0.0        0.0         0.0         0.0        0.0
1124709         0.0         0.0        0.0         0.0         0.0        0.0
541139          0.0         0.0        0.0         0.0         0.0        0.0
533625          0.0         0.0        0.0         0.0         0.0        0.0

          14A0327_26  14A0205_8  14A0329_26
OTU
4479944          0.0        0.0         0.0
995900           0.0        0.0         0.0
1124709          0.0        0.0         0.0
541139           0.0        0.0         0.0
533625           0.0        0.0         0.0

[5 rows x 280 columns]
```

Filter columns that are present in day and night period matrices based on "day_plot" association

[ ]:
```
otu_table_day_cols_filtered = otu_table_day_cols.
  ↪filter(items=otu_table_night_cols.columns)
otu_table_night_cols_filtered = otu_table_night_cols.
  ↪filter(items=otu_table_day_cols.columns)
```

[ ]:
```
print(otu_table_day_cols.shape)
print(otu_table_night_cols.shape)

print(otu_table_day_cols_filtered.shape)
print(otu_table_night_cols_filtered.shape)
```

```
(9057, 260)
(9057, 280)
(9057, 249)
(9057, 249)
```

[ ]:
```
otu_table_day_cols_filtered = otu_table_day_cols_filtered.
  ↪reindex(columns=otu_table_night_cols_filtered.columns)
```

[ ]:
```
if otu_table_day_cols_filtered.columns.all == otu_table_night_cols_filtered.
  ↪columns.all:
    print('Columns are equal!')
```

```
Columns are equal!
```

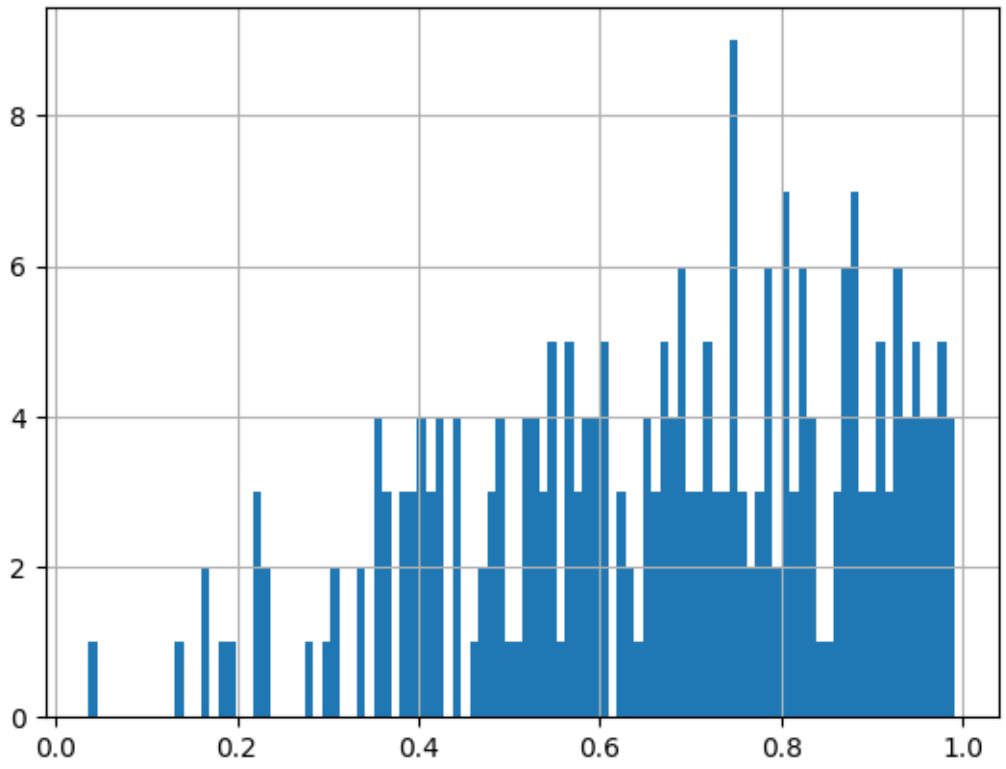
```
[ ]: if list(otu_table_day_cols_filtered.index) ==␣
      ↪list(otu_table_night_cols_filtered.index):
         print('Indices are equal!')
```

```
Indices are equal!
```

```
[ ]: otu_table_cols_filtered_corr = otu_table_day_cols_filtered.
      ↪corrwith(otu_table_night_cols_filtered, axis = 0)
```

```
[ ]: otu_table_cols_filtered_corr.hist(bins=100)
```

```
[ ]: <Axes: >
```



Generating a OTU table with merge day and night samples Summing OTU counts of the two dataframes (day and night).

This is only the matrix with cases where both day and night are present.

```
[ ]: sum_otu_filtered_df = otu_table_day_cols_filtered.
      ↪add(otu_table_night_cols_filtered)

     sum_otu_filtered_df.head(n=2)
```

[ ]:
```
          14A0247_8  14A0051_8  14A0381_26  14A0533_26  14A0281_8  14A0295_8  \
OTU
4479944        1.0        2.0         3.0         1.0        0.0        0.0
995900         0.0        0.0         0.0         0.0        5.0        8.0

          14A0169_26  14A0069_8  14A0497_26  14A0023_8  …  14A0345_8  \
OTU                                                     …
4479944          0.0        0.0         0.0        0.0  …        0.0
995900           6.0        1.0         1.0        1.0  …        0.0

          14A0267_8  14A0009_8  14A0007_8  14A0093_26  14A0137_26  14A0265_8  \
OTU
4479944        0.0        0.0        0.0         0.0         0.0        0.0
995900         0.0        0.0        0.0         0.0         0.0        0.0

          14A0155_26  14A0167_26  14A0481_26
OTU
4479944          0.0         0.0         0.0
995900           0.0         0.0         0.0

[2 rows x 249 columns]
```

[ ]:
```
sum_otu_filtered_df.to_csv('summed_day_night_otu_counts.tsv', sep='\t',␣
↪index=True)
```